(4) Four of the prevailing seiches, or free oscillations under the influence of inertia, on Lake Erie and Lake Michigan-Huron have been isolated. Their periods and probable methods of oscillation have been shown. The relation between these seiches and the uncertainties in daily mean elevations of the water surface at gage stations has been discerned. The appreciation of this relation aids decidedly in obtaining accurate determinations of the daily mean elevation of the mean surface of each lake.

(5) The accuracy with which the elevation of the mean surface of any one of the Great Lakes may be determined for any given day has been decidedly increased. On Lake Erie the elevation of the mean surface of the lake may now be determined as accurately from 1 day of observation at Buffalo as it was formerly possible to fix it from 16 days of observation at that station. Similarly, the elevation of the mean surface of Lake Michigan-Huron may now be determined as accurately from 1 day of observation at Mackinaw as it was formerly possible to determine it from 6 days of observation at that station. When one determines the fluctuation of elevation of the mean surface of a lake he thereby determines the fluctuation in the total water content of the lake.

(6) The relations of the new knowledge indicated in (1) to (5) to four outstanding problems have become evident. The four problems are:

(*a*) The problem of regulating the elevations of the water surface of each of the Great Lakes—and the rates of flow through the connecting streams, so as to secure the greatest aggregate benefits to navigation, power, development, and sanitation.

(*b*) The problem of determining the laws of evaporation from large free-water surfaces such as the surface of the Great Lakes.

(*c*) The problem of correcting the observed elevations of the water surface at a tide gage in such a manner as to remove the disturbances due to winds and fluctuating barometric pressures and thereby to secure a more accurate determination of mean sea level than could otherwise be obtained from said observations.

(*d*) The problem of determining the direction and rate of the tilting, which is believed to be in progress, of the land underlying and immediately surrounding the Great Lakes.

As to the accuracy of the results, the author considers it possible to determine the mean elevation of the whole of Lake Michigan-Huron, for example on any day, with a probable error of less than ± 0.010 foot, and that by using the three stations Milwaukee, Mackinaw, and Harbor Beach it would appear that the change in elevation of the mean surface of the whole lake for any one day may possibly be determined with a probable error of less than ± 0.007 foot—an accuracy hitherto unattainable.

NOTES, ABSTRACTS, AND REVIEWS.

Anton D. Udden (1886-1922).

On September 5, 1922, occurred the death of Dr. Anton D. Udden, at San Antonio, Tex. To those who were privileged to be associated with Doctor Udden, even for a short time, the news of his untimely death will be accepted with deepest regret.

It was not until 1917 that Doctor Udden's interest in meteorology was brought to the attention of the Weather Bureau, although he had taught meteorology, among other sciences, at Augustana College, Rock Island, Ill., for a number of years, and had completed most of the work required for the degree of Doctor of Philosophy in the University of Chicago. On January 1, 1918, he entered the service of the Weather Bureau as an observer at Davenport, Iowa; plans for undertaking research work at the Central Office in Washington were annulled by the induction of Doctor Udden into the military service on April 14, 1918, after only three and one-half months at the Davenport station. He was among the first of those selected by the Signal Corps to receive instruction in meteorology at College Station, Tex. Upon completing work in this school, Doctor Udden was assigned to Washington, D. C., and to the meteorological station at Cape May, N. J. Upon the completion of his military service, he resigned from the Weather Bureau to continue his work as instructor in physics at the University of Pennsylvania in Philadelphia. He was appointed McFadden Fellow of the American-Scandinavian Foundation and spent his last two years in study at the University of Copenhagen with Professor Bohr. His strenuous academic activities abroad culminated in a nervous collapse just as he was about to return to the United States. After receiving treatment during the summer in Christiania, he was brought by his wife and father to Texas late in August. His death from heart failure occurred only 11 days after arriving in the United States.

Doctor Udden's quiet demeanor, his modesty, his great capacity for work and study which revealed itself rather by his accomplishments than by brilliant display of knowledge, his genial disposition which remained placid under military circumstances ordinarily capable of irritating one of his attainments, his willingness to undertake commonplace tasks,—all are qualities which impressed his superiors and stimulated his fellows.

The publication of an article prepared by Doctor Udden is contemplated for an early number of the MONTHLY WEATHER REVIEW.—*C. L. M.*

Ştefan C. Hepites (1851-1922).

Notice has been received of the death of the first director of the Central Meteorological Institute of Roumania, Ştefan C. Hepites, at Braila, September 15, 1922, at the age of 71 years. Doctor Hepites was the organizer of the Roumanian Institute and devoted his life to researches in meteorology and other branches of geophysics.

The notice, signed by the present director, E. Otetelişnau, states that, during the reorganization period following the World War, the great experience and competence of the former director was of the utmost value to the Roumanian service.—*C. L. M.*

METEOROLOGICAL STATIONS IN THE ARCTIC.

Supervising Forecaster E. H. Bowie, writing in the Philadelphia *Public Ledger* of November 15, 1922, concerning the establishment of a chain of meteorological stations in the Arctic says:

> Stations are already in operation in Spitzbergen, Iceland, Jan Mayer (east of Greenland), and Alaska, from which regions daily reports are received by radio. The Amundsen Arctic exploration steamship *Maud*[1] is another link in the chain of outposts in the far north.
>
> Steps already have been taken to establish additional radio equipments and weather observatories in Greenland and Baffin Land; later, it seems probable, outposts will be operated in north central Canada and the north shore of Alaska; and eventually the chain of outposts will encircle the North Pole, along the Arctic Circle.

THE SUN'S ACTIVITY, 1890-1920.

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The sun, as is well known, is a variable star having a period of approximately 11 years, but, unlike other stars, its variability can be determined from several different visible phenomena and not solely from the total integrated

[1] Cf. this REVIEW, February, 1922, 50:74.